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Date: October 29, 1999
Docket No.: 1794-0123P

Assistant Commissioner for Patents
Box PATENT APPLICATION
Washington, D.C. 20231

Sir:

As authorized by the inventor(s), transmitted herewith for filing is a patent application applied for on behalf of the inventor(s) according to the provisions of 37 CFR 1.41(c).

Inventor(s): IDESAWA, Masanori
FUJITA, Toyomi; YANO, Yasushige

For: SEMICONDUCTOR IMAGE POSITION SENSITIVE DEVICE

Enclosed are:

X A specification consisting of 22 pages

X 9 sheet(s) of Formal drawings

___ Certified copy of Priority Document(s)

X Executed Declaration in accordance with 37 CFR 1.64 will follow

___ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27

___ Preliminary Amendment

X Information Sheet

___ Information Disclosure Statement, PTO-1449 with reference(s)

___ Other ____

The filing fee has been calculated as shown below:

			LARGE ENTITY			SMALL ENTITY	
FOR	NO. FILED	NO. EXTRA	RATE	FEE		RATE	FEE
BASIC FEE	*********** *********** ***********	********** ********** **********	***** ***** *****	$760.00	or	**** **** ****	$380.00
TOTAL CLAIMS	6 - 20 =	0	x18 =$	0.00	or	x 9 = $	0.00
INDEPENDENT	1 - 3 =	0	x78 =$	0.00	or	x 39 = $	0.00
MULTIPLE DEPENDENT CLAIM PRESENTED	yes		+260 =	$260.00	or	+130 = $	0.00
			TOTAL	$1,020.00		TOTAL $	0.00

_X_ The application transmitted herewith is filed in accordance with 37 CFR 1.41(c). The undersigned has been authorized by the inventor(s) to file the present application. The original duly executed patent application together with the surcharge will be forwarded in due course.

_X_ A check in the amount of $1,020.00 to cover the filing fee and recording fee (if applicable) is enclosed.

___ The Government Filing Fee will be paid at the time of completion of the filing requirement.

___ Please charge Deposit Account No. 02-2448 in the amount of $__________. A triplicate copy of this transmittal form is enclosed.

_X_ Send Correspondence to: BIRCH, STEWART, KOLASCH & BIRCH, LLP
P. O. Box 747
Falls Church, Virginia 22040-0747

____ No fee is enclosed.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. 1.16 or under 37 C.F.R. 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

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1794-0123P

IN THE U.S. PATENT AND TRADEMARK OFFICE

INFORMATION SHEET

Applicant: IDESAWA, Masanori
FUJITA, Toyomi
YANO, Yasushige

Application No.:

Filed: October 29, 1999

For: SEMICONDUCTOR IMAGE POSITION SENSITIVE DEVICE

Priority Claimed:

COUNTRY	DATE	NUMBER
JAPAN	10/30/99	10-309765

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The above information is submitted to advise the USPTO of all relevant facts in connection with the present application. A timely executed Declaration in accordance with 37 CFR 1.64 will follow.

Respectfully submitted,

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SPECIFICATION

Title of the Invention

SEMICONDUCTOR IMAGE POSITION SENSITIVE DEVICE

Background of the Invention

Field of The Invention

The present invention relates to a semiconductor image position sensing device, and more particularly to a semiconductor image position sensing device for sensing a position of a spot image at high speed. Especially, the invention relates to a semiconductor image position sensing device used in a sensor for determining an optical position in a variety of automation systems or a variety of optical measuring systems and suitable for realizing a high-speed and simple sensing system or measuring system.

Description of The Related Art

Heretofore, a semiconductor image position sensitive device has been known as a sensor for detecting simply a spot image position at high speed.

In general, a semiconductor image position sensitive device is composed of a photoelectric layer, a deviding resistance layer laminated on the photoelectric layer, and signal current output terminals connected to the deviding resistance layer. Such semiconductor image position sensitive device is constituted on the basis of such a basic principle that when light irradiated from a spot is input to the photoelectric

layer, a photoelectric current is generated in the photoelectric layer, the photoelectric current thus generated in the photoelectric layer is allowed to flow into the deviding resistance layer, whereby the photoelectric current distributed in response to a resistance value between an inflow portion of the photoelectric current in the deviding resistance layer and the signal current output terminals is settled, and a center-of-gravitational position of incident light into the photoelectric layer is calculated based on an electric current value output from the signal current output terminals.

A conventional semiconductor image position sensitive device constituted on the basis of the above described basic principle will be explained in detail herein by referring to the accompanying drawings.

Namely, FIG. 1 is a conceptual view showing the structure of a conventional semiconductor image position sensitive device, and FIG. 2 is a conceptual diagram of an equivalent circuit exhibiting a principle of the calculation for sensing an image position in the semiconductor image position sensitive device of FIG. 1 wherein the semiconductor image position sensitive device comprises a P-type semiconductor layer P, an insulator layer I laminated on the bottom side of the P-type semiconductor layer P, an N-type semiconductor layer N laminated on the bottom side of the insulator layer P, a resistance layer R_P for calculating an image position and which is laminated on the surface side of the P-type semiconductor layer P, a signal current output terminal A as well as a signal current output terminal B formed on the opposite ends of the

resistance layer R_P on the surface side thereof, and a bias terminal C formed on the bottom side of the N-type semiconductor layer N at the central portion thereof.

In the above described semiconductor position sensitive device S, a photoelectric layer S is formed from the P-type semiconductor layer P, the insulator layer I, and the N-type semiconductor layer N, while the deviding resistance layer is formed from the resistance layer R_P.

In such semiconductor image position sensitive device as described above, when light L is irradiated from the surface side of the resistance layer R_P, photoelectric current generated in the photoelectric current layer S at an incident position of the light L flows into the resistance layer R_P, the photoelectric current thus flowed into the resistance layer R_P is distributed in response to a resistance value defined between a position at which the photoelectric current flowed into the resistance layer R_P and the signal current output terminals A and B, whereby output signal currents I_A and I_B are output from the signal current output terminals A and B, respectively (see FIG. 2).

In this case, when it is supposed that resistivity of the resistance layer R_P is constant, the resistance value is proportional to a distance defined between the position at which photoelectric current is flowed into the resistance layer R_P and the signal current output terminals A and B, so that information X at an incident position of the light L (being equivalent to a ratio of dislocation from the central position of the resistance layer R_P) is determined by an equation (1):

$$X = (I_A - I_B)/(I_A + I_B) \quad \ldots\ldots \quad (1)$$

In the meantime, it is constituted in such that the photoelectric current layer S is continuous, and the resistance layer R_P being a deviding resistance for calculating an image position is formed as a thin film superposed on the photoelectric layer S in the semiconductor image position sensitive device shown in FIGS. 1 and 2.

However, it is not so easy that the resistance layer R_P being a deviding resistance for calculating an image position is formed stably as a uniform thin film having a predetermined resistivity, and as a result, such resistivity cannot be made constant, whereby a distribution of the resistivity becomes scattered, so that there is a problem that the scattering becomes a factor of an error in sensing for image position.

In order to solve such problem as described above, devised is a semiconductor image position sensitive device of separate photoelectric device type wherein a photoelectric layer is fabricated as a separate photoelectric layer of a split structure separated into plural sections being independent of a deviding resistance layer, while the deviding resistance layer is fabricated stably as a constriction resistance at a position away from the separate photoelectric layer, and photoelectric currents generated in the split photoelectric layer having a structure which has been separated and split individually into sections are allowed to flow condensedly into positions corresponding to the deviding resistance layers.

FIG. 3 is a conceptual diagram of an equivalent circuit exhibiting a principle of such semiconductor image position sensitive device of a separate photoelectric device type as

described above.

In FIG. 3, reference character Sg designates a separate photoelectric layer in the semiconductor image position sensitive device of split photoelectric device type. According to the semiconductor image position sensitive device of split photoelectric device type as described above, a resistance layer R_P can be stably fabricated as a deviding resistance for calculating an image position, whereby errors in sensing an image position is allowed to decrease, so that it is possible to improve stability in sensing an image position.

Furthermore, a photoelectric current generated by irradiating the light L in any structure in any semiconductor image position sensitive device as described above shown in FIGS. 1 through 3 is output from the signal current output terminal A as an output signal electric current I_A, while it is output from the signal current output terminal B as an output signal current I_B (see FIGS. 2 and 3). Accordingly, when a calculation is made on the basis of the equation (1) by applying the output signal currents I_A and I_B, it becomes possible to calculate a position of spot image by means of an analog arithmetic circuit at extremely high-speed.

Meantime, a gravitational position of all the light L input to a sensing region of light is sensed, but not the brightest point of a spot image in a semiconductor image position sensitive device based on the principle applying the above described equation (1). For this reason, it has been pointed out that there is such a problem that when a noise light such as background light occupying a large area though

brightness is not high exists in a wide region in a peripheral section of an objective spot image, a significant error appears at a sensing position of light as a result of influence of noise light such as background noise.

In other words, if no background light exists in a wide region extending over the peripheral part around the objective spot image, a distribution of photoelectric current based on the light L derived from the spot image is as shown in FIG. 4(a). However, when noise light such as background light exists, a photoelectric current based on the noise light is also generated in a photoelectric layer S (separate photoelectric layer Sg), so that the resulting photoelectric current based on noise light such as background light is superposed on the photoelectric current based on the light L derived from the spot image, and hence, a distribution of photoelectric current becomes as shown in FIG. 4(b).

More specifically, when output signal currents I_A and I_B obtained from a photoelectric current onto which has been superposed noise light are applied to the equation (1) in case of existing noise light, a position of the spot image is calculated. As a result, such position of the spot image is biased towards a direction of gravitational position of noise light, so that there is a problem of generating a remarkable error in sensing the position.

When a further specific explanation is made in this respect, a photoelectric current generated in response to the light derived from a spot image is distributed to be output in accordance with a resistance value between a flowing-in

position and output terminals because of presence of a deviding resistance in a semiconductor image position sensitive device, and when electric current values of the photoelectric currents which have been thus distributed to be output (output signal currents I_A and I_B) are calculated, a gravitaional position of the incident light L is determined.

For this reason, not only a photoelectric current generated in response to irradiation of the light L derived from a spot image as a signal to be sensed, but also a photoelectric current produced from noise light is reflected with respect to the output signal currents I_A and I_B in the case where noise light such as background light exists.

In order to avoid influence of such noise light, such a manner that a spot to be sensed is flashed on and off, an output in the case where the spot is flashed off is subtracted from an output in the case where the spot is flashed on, whereby influence of background light is removed has been heretofore applied.

However, the above described manner can be applied in only the case where spot can be flashed on and off, besides the case where noise light does not depend upon flashing on and off of the spot. In this respect, there is no effect with respect to reduction of errors due to noise light produced by irradiation of the light L derived from the spot.

In general, a density of a photoelectric current generated by noise light such as background light is considerably lower than that of a photoelectric current generated by irradiation of the light derived from a spot.

However, since an area of incidence in noise light towards a photoelectric layer is remarkably wider than that of light derived from a spot towards the photoelectric layer, contributions upon the output signal currents I_A and I_B of the noise light are unable to disregard as a whole.

Accordingly, a position of gravity obtained by calculating the output signal currents I_A and I_B is dragged by a gravity of noise light such as background light, so that such a value which is deviated from a primary position of the spot is obtained. Thus, there is a problem wherein an error in case of sensing an image position becomes remarkable.

In this respect, since noise light such as background light is averagely distributed within a sensing region of a semiconductor image position sensitive device in general, a gravitational position of output signal currents I_A and I_B derived from noise light such as background light is in the vicinity of a central portion of a sensing region, so that a position for sensing an image is dragged by such result as described above, whereby the resulting value becomes the one which deviates towards the central portion of the sensing region.

Objects and Summary of The Invention

The present invention has been made in view of the above described problems involved in the prior art. An object of the invention is to provide a semiconductor image position sensitive device by which errors in sensing an image position produced by influence of noise light such as background light

are reduced.

In order to achieve the above described object, a semiconductor image position sensitive device according to the present invention has been made on the basis of such fact that a photoelectric current density based on noise light such as background light is considerably lower than that based on irradiation of light derived from a spot image. The present invention is further constituted in such that a photoelectric current flowing into a deviding resistance contains dominantly a photoelectric current generated on the basis of a spot image by subtracting a substantially equal photoelectric current having a distribution of electric current density corresponding to that of an electric current generated on the basis of noise light from photoelectric currents generated in respective portions in a photoelectric layer. When it is constituted in such that a photoelectric current having a value corresponding to that of a photoelectric current based substantially on noise light is subtracted in a region where the photoelectric current based on background light and to be subtracted has a higher value than that of the photoelectric current generated on the basis of a spot image, it is possible to be adapted that only a part having a high density of photoelectric current, in other words, an electric current obtained only from the part corresponding to an incident position of light derived from a spot image flows into a deviding resistance.

Therefore, in accordance with a semiconductor image position sensitive device of the present invention, a ratio of contribution of a photoelectric current produced by noise light

such as background light can be remarkably reduced with respect to an electric current flowing into a deviding resistance relevant to sensing for an image position, whereby errors in sensing an image position due to noise light such as background light can be significantly reduced.

Namely, a semiconductor image position sensing device according to the present invention is the one provided with a photoelectric layer generating a photoelectric current in a portion onto which light was input in response to intensity of the light input to the photoelectric layer, a resistance layer laminated on the photoelectric layer in which the photoelectric current generated in the photoelectric layer flows into a portion corresponding to that onto which the light was input, and signal current output terminals wherein the photoelectric current generated in the photoelectric layer is distributed in a ratio in response to a resistance value between the signal current output terminals and the resistance layer defined at a position where the photoelectric current was flowed into the resistance layer and from which the photoelectric current is output as an electric current obtained by summing currents over the whole sensing sections altogether, comprising further a resistance subtracting a photoelectric current having a predetermined distribution of electric current density from photoelectric currents generated in respective portions of the photoelectric layer over the whole sensing sections, and the photoelectric current subtracted by means of the resistance being adapted to flow into the resistance layer.

Furthermore, the semiconductor image position sensitive

device of the invention as defined in claim 1, wherein the resistance subtracts an electric current having a predetermined density distribution in a section where each density of the photoelectric currents generated in respective sections of the photoelectric layer in response to incident light is higher than the predetermined electric current density, while the resistance subtracts an electric current having a density distribution corresponding to that of the photoelectric current in a section where each density of the photoelectric currents is lower than that of the predetermined electric current density.

Still further, the semiconductor image position sensitive device of the invention is the one as defined in any one of claims 1 and 2, wherein the photoelectric layer generating a photoelectric current in response to intensity of light is separated into plural portions and they are adapted to act as individual photoelectric devices, respectively, photoelectric currents generated in the photoelectric device which have been separated into the plural portions are adapted to flow concentratively into the resistance layer in each of the portions corresponding to respective positions, an electric current to be subtracted having a predetermined distribution of electric current density is the one obtained by putting them corresponding to the respective separated photoelectric devices together, and remainders as a result of subtraction from the photoelectric currents of the separated photoelectric devices, respectively, are adapted to flow into the resistance layer.

Yet further, the semiconductor image position sensitive

device of the invention is the one as defined in claim 3, wherein an electric current obtained by subtracting an electric current put together from a photoelectric current is adapted to flow into the resistance layer in the case where photoelectric currents generated in response to projectile light in the respective separated photoelectric devices are larger than an electric current obtained by putting together an electric current to be subtracted having a predetermined distribution of electric current density with respect to those corresponding to the respective separated photoelectric devices, while an electric current obtained by subtracting the photoelectric currents generated in the photoelectric devices is adapted to flow into the resistance layer in the case where the former photoelectric currents are smaller than the latter electric currents.

Brief Description of The Drawings

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a conceptual view showing a structure of a conventional semiconductor image position sensitive device;

FIG. 2 is a conceptual diagram of an equivalent circuit exhibiting a principle for calculating image position sensing in the semiconductor image position sensing device shown in FIG. 1;

FIG. 3 is a conceptual diagram of an equivalent circuit exhibiting a principle of a semiconductor image position sensitive device of separate photoelectric device type;

FIG. 4(a) is a conceptual diagram showing a distribution of photoelectric current density based on irradiation of light derived from a spot image, and FIG. 4(b) is a conceptual diagram showing a distribution of photoelectric current density in the case where noise light such as background light exists;

FIG. 5 is a conceptual diagram showing an example of an equivalent circuit exhibiting a principle of a semiconductor image position sensitive device according to the present invention wherein the semiconductor image position sensitive device is the one of a continuous photoelectric device type;

FIG. 6 is a conceptual diagram showing an example of an equivalent circuit exhibiting a principle of a semiconductor image position sensitive device according to the present invention wherein the semiconductor image position sensitive device is the one of a separate photoelectric device type;

FIG. 7(a) is a conceptual diagram showing a distribution of photoelectric current density in the case where noise light such as background light exists, and FIG. 7(b) is a conceptual diagram showing a distribution of photoelectric current density in the case where a photoelectric current based on noise light such as background light is subtracted;

FIG. 8 is a conceptual diagram showing an example of an equivalent circuit exhibiting a principle of a semiconductor image position sensitive device according to the present invention into which has been inserted a diode for preventing

interference wherein the semiconductor image position sensitive device is the one of a continuous photoelectric device type; and

FIG. 9 is a conceptual diagram showing an example of an equivalent circuit exhibiting a principle of a semiconductor image position sensitive device according to the present invention into which has been inserted a diode for preventing interference wherein the semiconductor image position sensitive device is the one of a separate photoelectric device type.

Detailed Description of The Preferred Embodiments

Examples of preferred embodiments of the semiconductor image position sensitive device according to the present invention will be described in detail hereinafter in conjunction with the accompanying drawings.

It is to be noted that the same or equivalent components as or to those of FIGS. 1 through 4 are designated by the same reference characters in FIGS. 5 through 9 wherein the detailed description relating thereto will be omitted.

FIG. 5 shows an example of preferred embodiments of a semiconductor image position sensitive device according to the present invention wherein the semiconductor image position sensitive device is constituted in such that an electric current obtained by subtracting an amount of electric current corresponding to a current density of noise light such as background light from the photoelectric current shown in FIG. 4(b) flows into a deviding resistance for calculating an image

position.

More specifically, FIG. 5 shows an equivalent circuit representing an example of the preferred embodiments of a semiconductor image position sensitive device according to the present invention wherein the present semiconductor image position sensitive device is the one of a continuous photoelectric device type to which has been connected a subtracting current limiting resistance rd for subtracting an electric current having a wider distribution of electric current density than that of a photoelectric current based on noise light such as background light.

Accordingly, it becomes possible that flowing of a photoelectric current generated on the basis of noise light such as background light into a resistance layer RP being a deviding resistance for calculating an image position is significantly reduced by the use of the subtracting current limiting resistance rd.

More specifically, when it is constituted in such that an electric current having a somewhat wider distribution of electric current density than that of a photoelectric current based on noise light such as background light is subtracted by means of the subtracting electric current limiting resistance rd, a substantially equivalent value to that of the photoelectric current can be subtracted from a photoelectric current extending over a whole sensing region in reality, and as a result, only a photoelectric current based substantially on a spot image flows ideally into the resistance layer R_P being a deviding resistance for calculating an image position as shown

in FIG. 7(b).

FIG. 6 shows an equivalent circuit representing an example of the preferred embodiments of a semiconductor image position sensitive device according to the present invention wherein the present semiconductor image position sensitive device is the one of a separate photoelectric device type to which has been connected a subtracting current limiting resistance rd for subtracting an electric current having a somewhat wider distribution of electric current density than that of a photoelectric current based on noise light such as background light.

Since a function of the subtracting electric current limiting resistance rd has been described in the example shown in FIG. 5, the explanation therefor will be omitted.

Furthermore, when a resistance value of the subtracting electric current limiting resistance rd is set at a lower value than that of the resistance layer R_P, interference between the adjacent portions in case of subtracting electric current by means of the subtracting electric current limiting resistance rd can be reduced.

Moreover, FIG. 8 shows an equivalent circuit representing an example of the preferred embodiments of a semiconductor image position sensitive device according to the present invention wherein the present semiconductor image position sensitive device is the one of a continuous photoelectric device type to which has been connected a subtracting current limiting resistance rd for subtracting an electric current having a wider distribution of electric

current density than that of a photoelectric current based on noise light such as background light, and in addition, into which a diode Sd for preventing interference has been inserted.

Thus, it is arranged in such that interference between adjacent portions in case of subtracting a photoelectric current based on noise light such as background light is avoided by inserting the diode Sd for preventing interference in the equivalent circuit. In this case, it becomes possible to constitute the equivalent circuit in such that a photoelectric current having a value equivalent to that of a photoelectric current generated as a result of irradiation of light upon a spot image is subtracted in a region where a value of a photoelectric current to be subtracted is larger than that of the photoelectric current based on irradiation of light upon the spot image, so that an electric current which flows into the resistance layer R_P in that region becomes substantially zero.

Still further, FIG. 9 shows an equivalent circuit representing an example of the preferred embodiments of a semiconductor image position sensitive device according to the present invention wherein the present semiconductor image position sensitive device is the one of a separate photoelectric device type to which has been connected a subtracting current limiting resistance rd for subtracting an electric current having a wider distribution of electric current density than that of a photoelectric current based on noise light such as background light, and in addition, into which a diode Sd for preventing interference has been inserted.

According to the present invention, since a

semiconductor image position sensitive device has been constituted as described above, the invention exhibits such excellent advantage that occurrence of errors in sensing an image position which are derived from noise light such as background noise can be reduced.

It will be appreciated by those of ordinary skill in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof.

The presently disclosed embodiments are therefore considered in all respects to be illustrated and not restrictive. The scope of the invention is indicated by the appended claims rather than the foregoing description, and all changes that come within the meaning and range of equivalents thereof are intended to be embraced therein.

The entire disclosure of Japanese Patent Application No. 10-309765 filed on October 30, 1998 including specification, claims, drawings and summary are incorporated herein by reference in its entirety.

What is claimed is

1. A semiconductor image position sensing device provided with a photoelectric layer generating a photoelectric current in a portion onto which light was input in response to intensity of the light input to the photoelectric layer,

a resistance layer laminated on said photoelectric layer in which the photoelectric current generated in said photoelectric layer flows into a portion corresponding to that onto which said light was input, and

signal current output terminals wherein the photoelectric current generated in said photoelectric layer is distributed in a ratio in response to a resistance value between the signal current output terminals and said resistance layer defined at a position where the photoelectric current was flowed into said resistance layer and from which the photoelectric current is output as an electric current obtained by summing currents over the whole sensing sections altogether, comprising:

a resistance subtracting a photoelectric current having a predetermined distribution of electric current density from photoelectric currents generated in respective portions of the photoelectric layer over the whole sensing sections, and

the photoelectric current subtracted by means of said resistance being adapted to flow into said resistance layer.

2. A semiconductor image position sensitive device as claimed in claim 1, wherein said resistance subtracts an electric current having a predetermined density distribution in a section where each density of the photoelectric currents

generated in respective sections of said photoelectric layer in response to incident light is higher than the predetermined electric current density, while said resistance subtracts an electric current having a density distribution corresponding to that of the photoelectric current in a section where each density of the photoelectric currents is lower than that of said predetermined electric current density.

3. A semiconductor image position sensitive device as claimed in any one of claims 1 and 2, wherein said photoelectric layer generating a photoelectric current in response to intensity of light is separated into plural portions and they are adapted to act as individual photoelectric devices, respectively, photoelectric currents generated in the photoelectric device which have been separated into the plural portions are adapted to flow concentratively into the resistance layer in each of the portions corresponding to respective positions, an electric current to be subtracted having a predetermined distribution of electric current density is the one obtained by putting them corresponding to the respective separated photoelectric devices together, and remainders as a result of subtraction from the photoelectric currents of the separated photoelectric devices, respectively, are adapted to flow into the resistance layer.

4. A semiconductor image position sensitive as claimed in claim 3, wherein an electric current obtained by subtracting an electric current put together from a photoelectric current is adapted to flow into the resistance layer in the case where photoelectric currents generated in response to projectile

light in the respective separated photoelectric devices are larger than an electric current obtained by putting together an electric current to be subtracted having a predetermined distribution of electric current density with respect to those corresponding to the respective separated photoelectric devices, while an electric current obtained by subtracting the photoelectric currents generated in the photoelectric devices is adapted to flow into the resistance layer in the case where the former photoelectric currents are smaller than the latter electric currents.

Abstract of The Disclosure

In order to reduce errors in sensing an image position derived from noise light such as background noise, a semiconductor image position sensing device is provided with a photoelectric layer generating a photoelectric current in a portion onto which light was input in response to intensity of the light input to the photoelectric layer, a resistance layer laminated on the photoelectric layer in which the photoelectric current generated in the photoelectric layer flows into a portion corresponding to that onto which the light was input, and signal current output terminals wherein the photoelectric current generated in the photoelectric layer is distributed in a ratio in response to a resistance value between the signal current output terminals and the resistance layer defined at a position where the photoelectric current flowed into the resistance layer and from which the photoelectric current is output as an electric current obtained by summing currents over the whole sensing sections altogether, comprising further a resistance subtracting a photoelectric current having a predetermined distribution of electric current density from photoelectric currents generated in respective portions of the photoelectric layer over the whole sensing sections, and the photoelectric current subtracted by means of the resistance being adapted to flow into the resistance layer.

FIG. 1

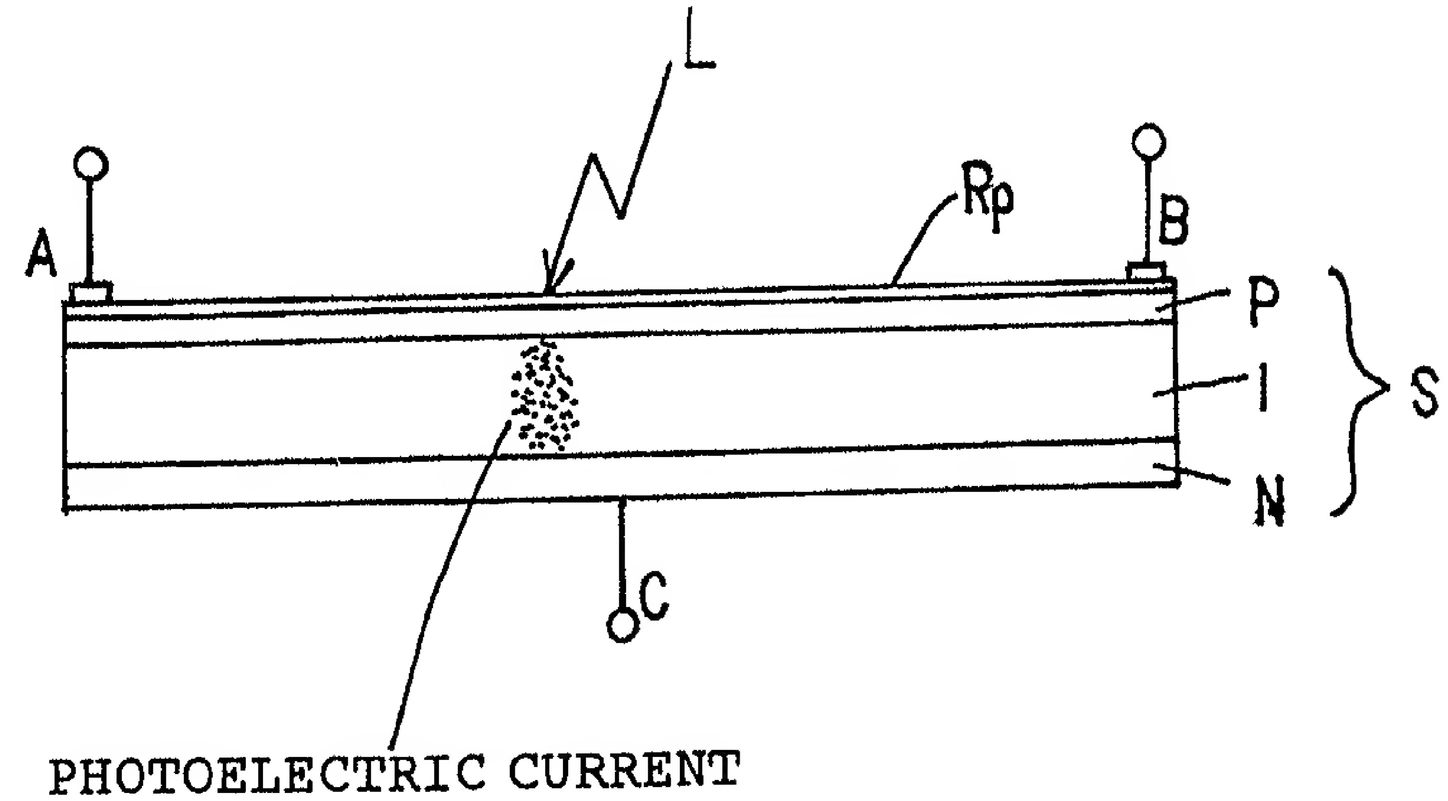


FIG. 2

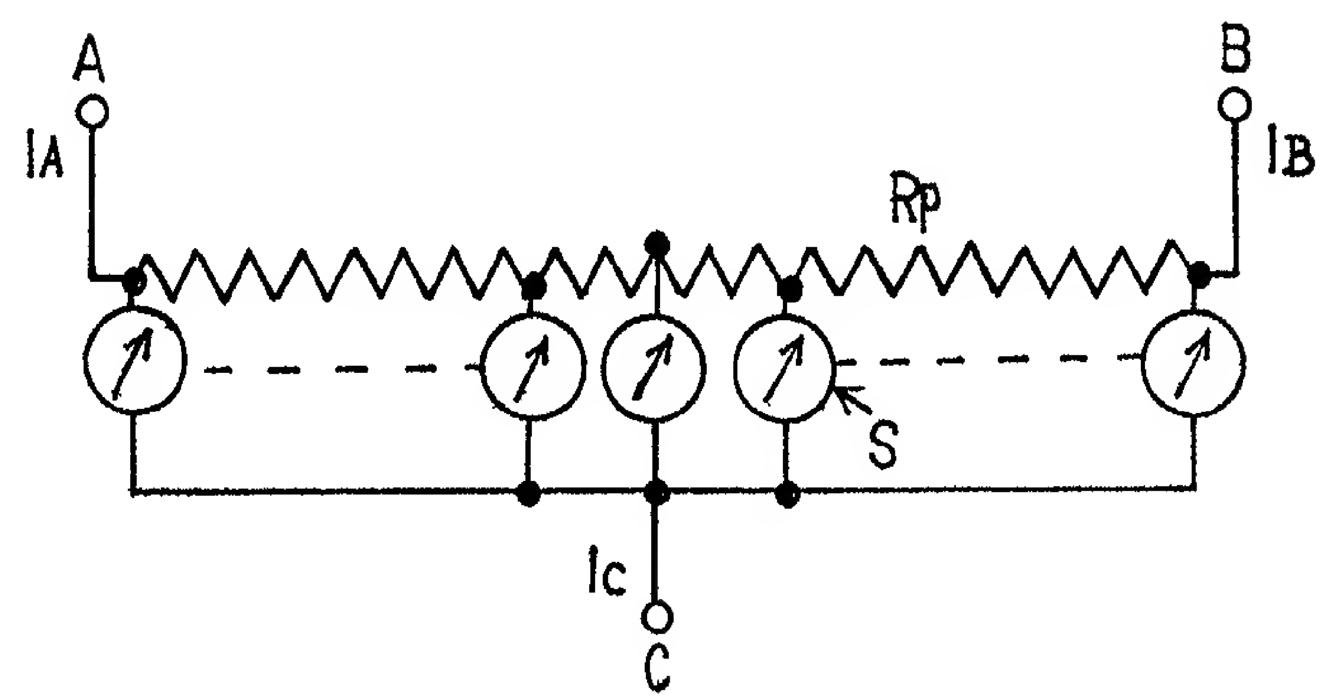
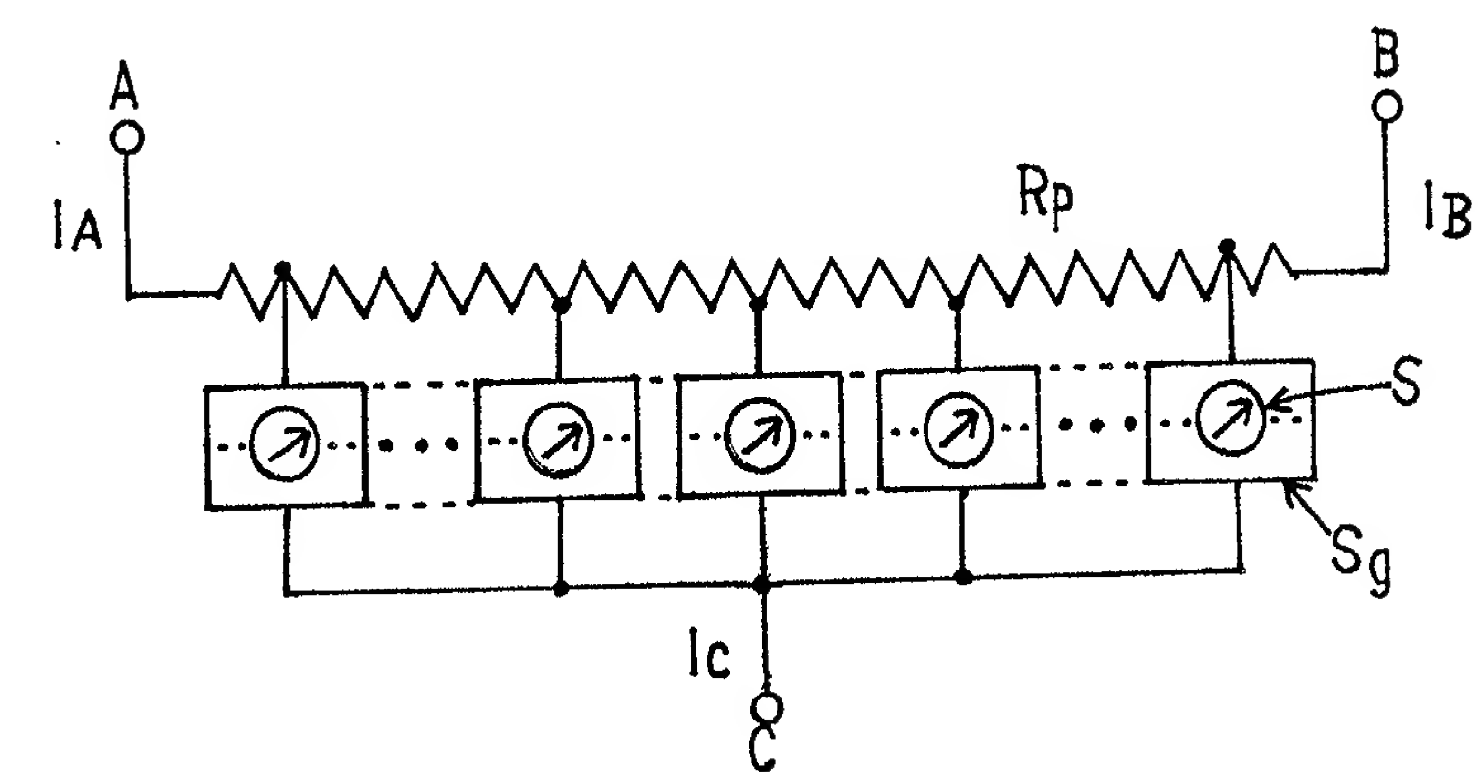


FIG. 3



F I G. 4

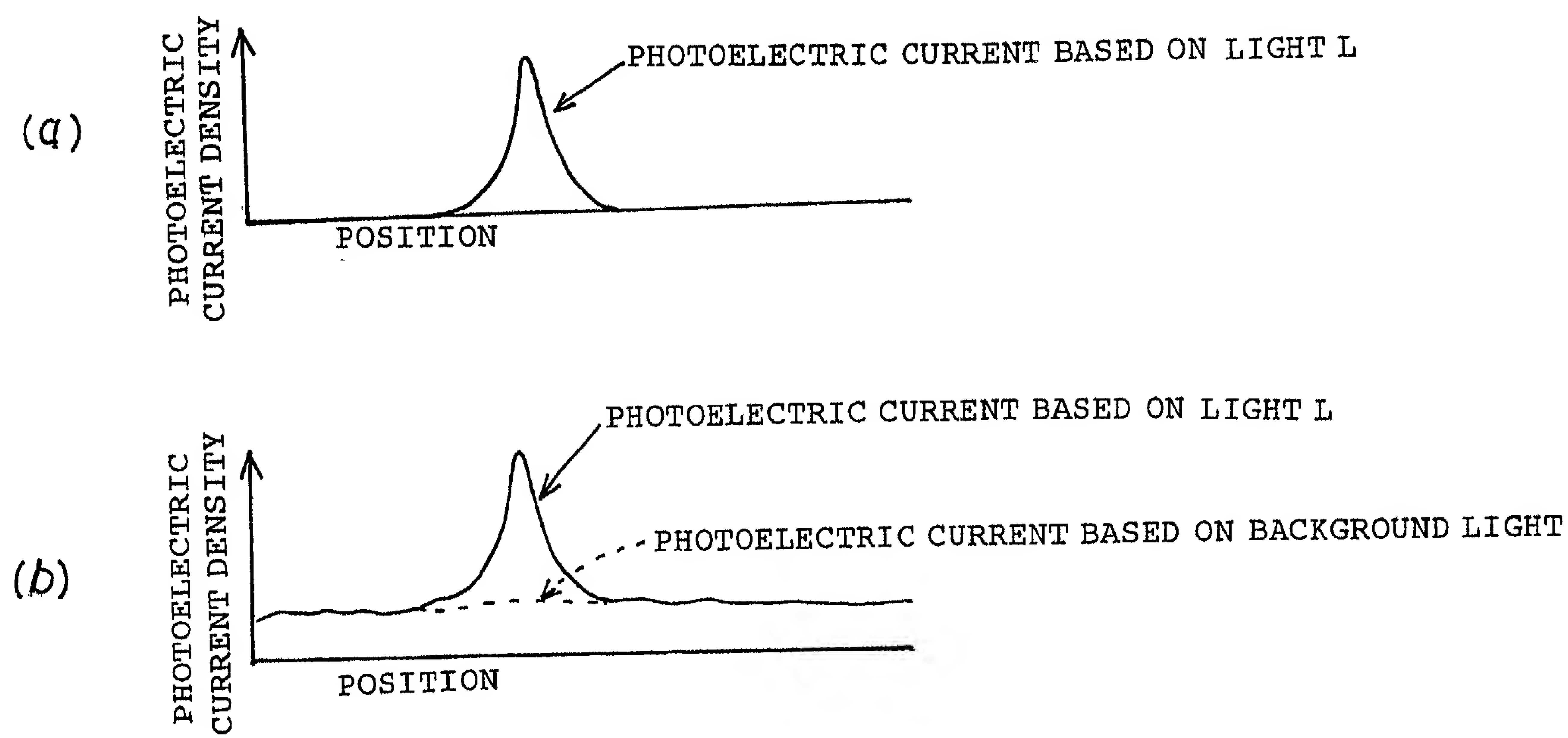

(a)
PHOTOELECTRIC CURRENT DENSITY
POSITION
PHOTOELECTRIC CURRENT BASED ON LIGHT L
(b)
PHOTOELECTRIC CURRENT DENSITY
POSITION
PHOTOELECTRIC CURRENT BASED ON LIGHT L
PHOTOELECTRIC CURRENT BASED ON BACKGROUND LIGHT

FIG. 5

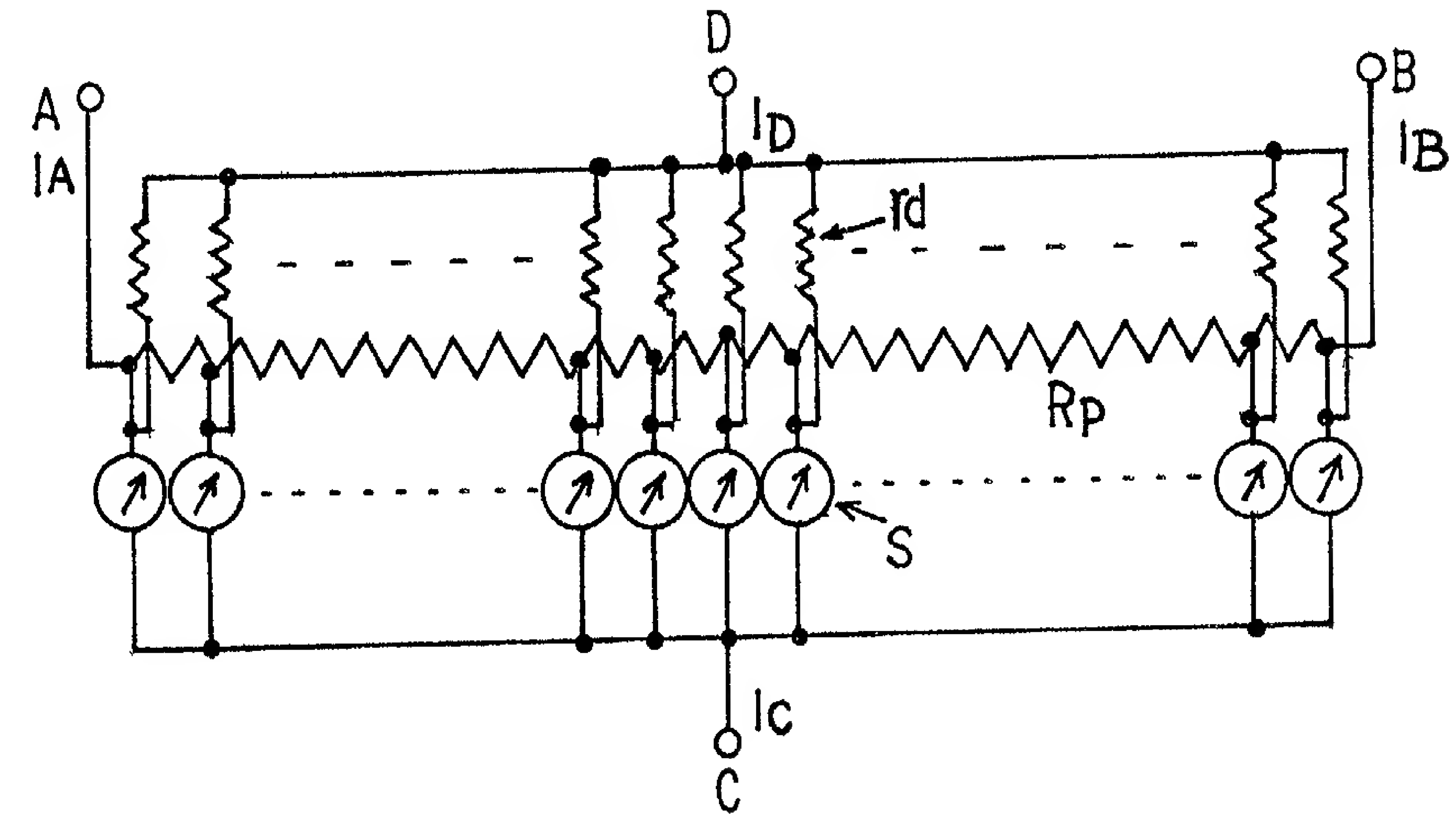


FIG. 6

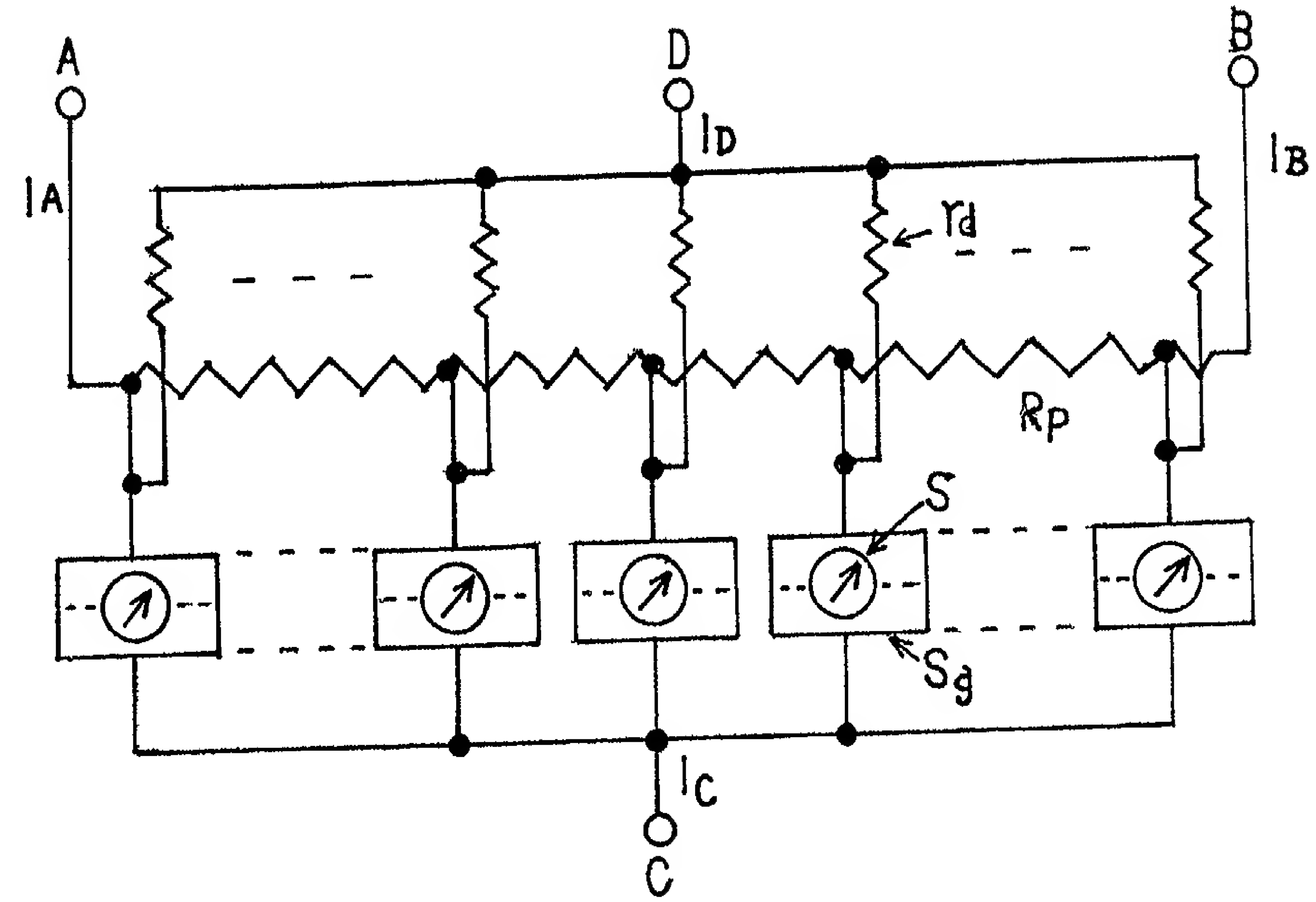


FIG. 7

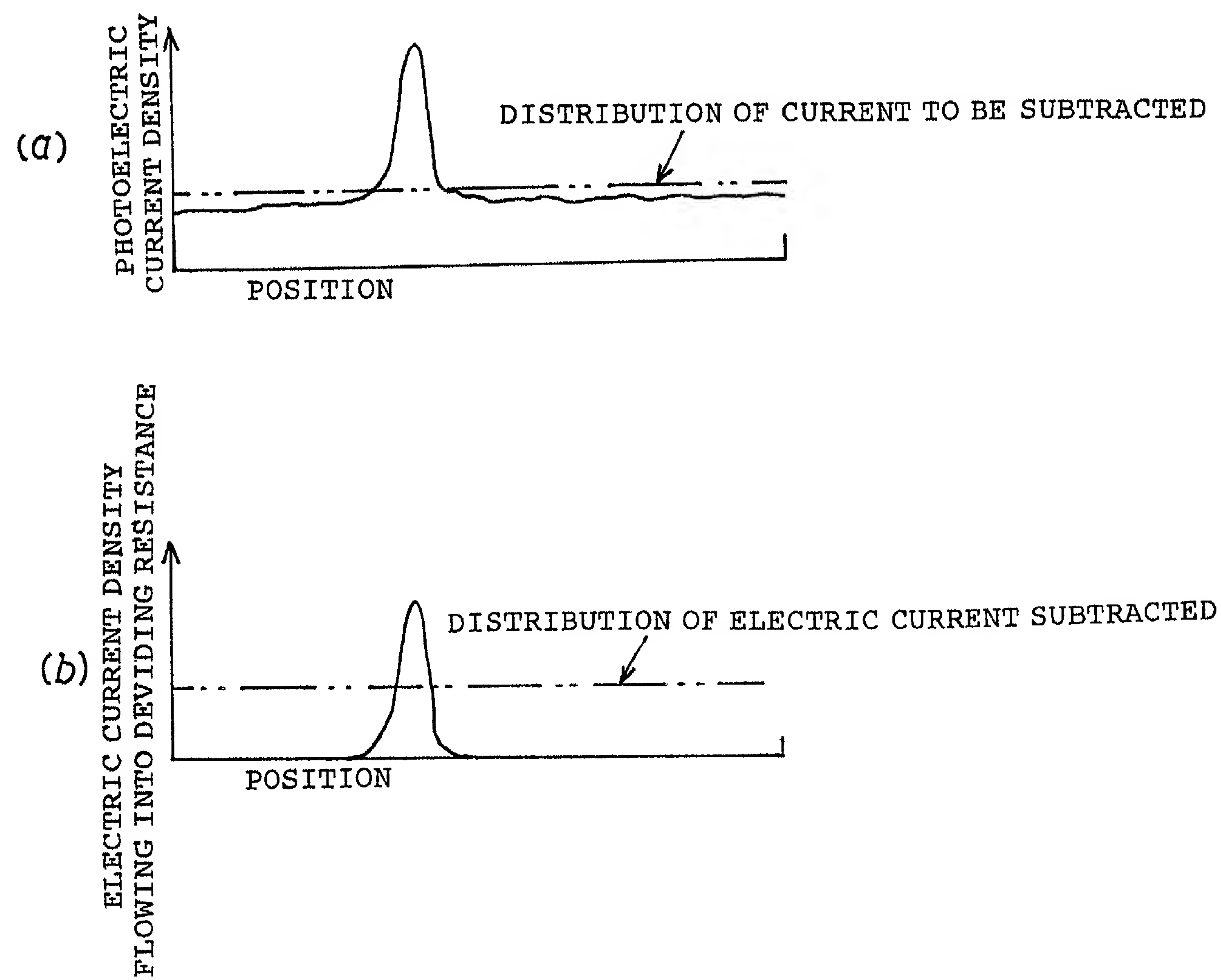

(a)
PHOTOELECTRIC CURRENT DENSITY
DISTRIBUTION OF CURRENT TO BE SUBTRACTED
POSITION
(b)
ELECTRIC CURRENT DENSITY FLOWING INTO DEVIDING RESISTANCE
DISTRIBUTION OF ELECTRIC CURRENT SUBTRACTED
POSITION

FIG. 8

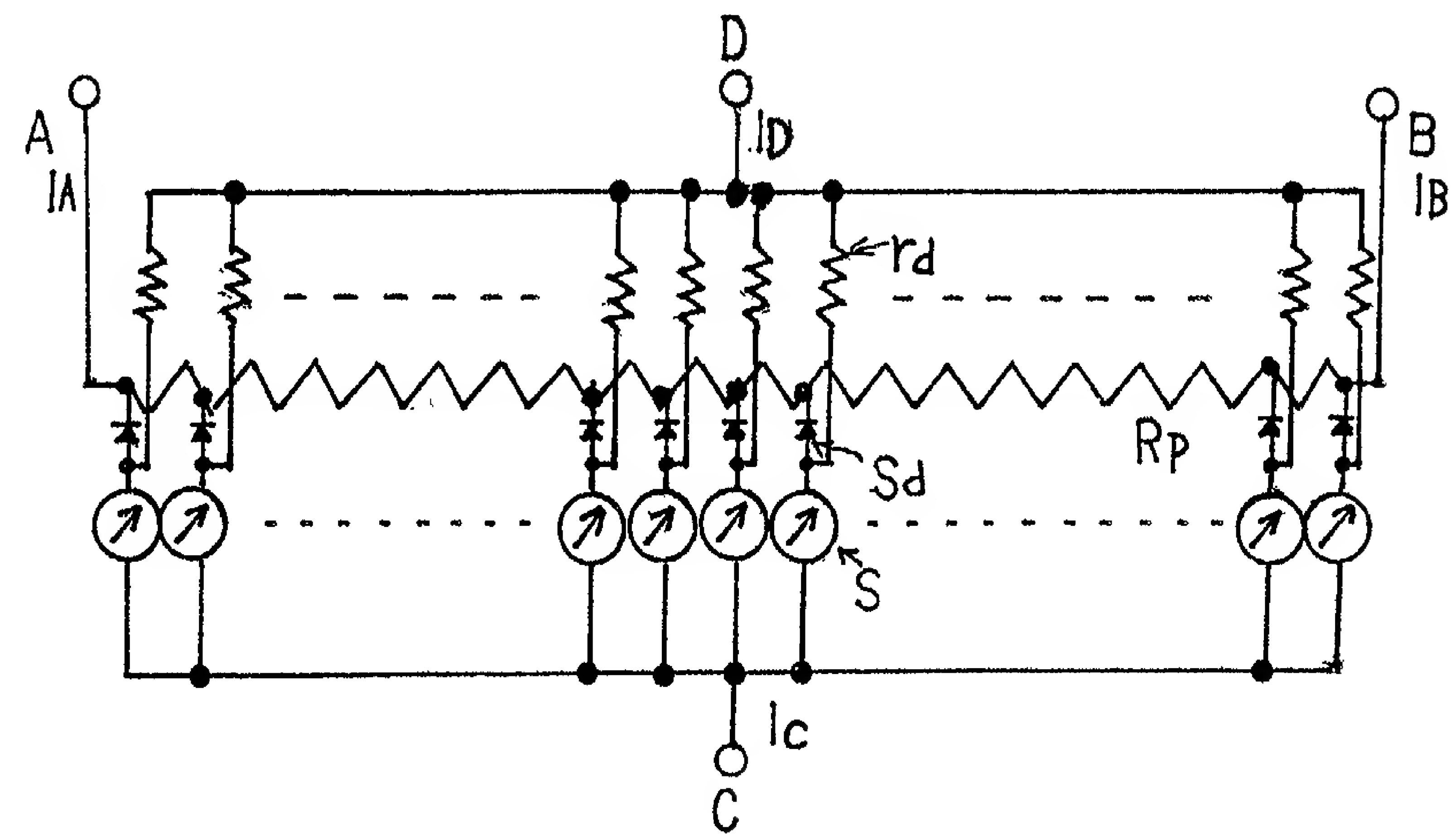


FIG. 9